

SEQUENCE LISTING

<110> Peltz, Stuart
Czaplinski, Kevin
Dinman, Jonathan D.

<120> A SUBFAMILY OF RNA HELICASES WHICH ARE MODULATORS OF
THE FIDELITY OF TRANSLATION TERMINATION AND USES
THEREOF

<130> 601-1-85N

<140> 09/359,268

<141> 1999-07-22

<150> 60/093,685

<151> 1998-07-22

<160> 32

<170> PatentIn Ver. 2.0

<210> 1

<211> 9

<212> PRT

<213> Saccharomyces cerevisiae

<220>

<223> Xaa = any amino acid

<400> 1

Gly Pro Pro Gly Thr Lys Thr Xaa Thr

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<210> 2

<211> 14

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<213> Saccharomyces cerevisiae

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<223> Xaa = any amino acid

<400> 2

Arg Ile Leu Xaa Cys Ala Ser Asn Xaa Ala Val Asp Xaa Leu

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<212> PRT
<213> *Saccharomyces cerevisiae*

<220>
<223> Xaa = any amino acid

<400> 3
Val Val Ile Asp Glu Xaa Xaa Gln Ala Xaa Xaa Xaa Xaa Xaa Ile Pro
1 5 10 15

Ile

<210> 4
<211> 12
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<213> *Saccharomyces cerevisiae*

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<223> Xaa = any amino acid

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Xaa Xaa Ile Leu Ala Gly Asp Xaa Xaa Gln Leu Pro
1 5 10

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<213> *Saccharomyces cerevisiae*

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<223> Xaa= any amino acid

<400> 5
Leu Xaa Xaa Ser Leu Phe Glu Arg Val
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<210> 6
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<223> Xaa = any amino acid

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Leu Xaa Xaa Gln Tyr Arg Met His Pro Xaa Ile Ser Glu Phe Pro Xaa
1 5 10 15

Tyr Xaa Gly Xaa Leu
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<210> 7

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<213> *saccharomyces cerevisiae*

<220>

<223> Xaa = any amino acid

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Ile Gly Val Ile Thr Pro Tyr Xaa Xaa Gln Val Xaa Xaa Leu
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<212> PRT

<213> *Saccharomyces cerevisiae*

<220>

<223> Xaa = any amino acid

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Val Glu Val Xaa Thr Val Asp Xaa Phe Gln Gly Arg Glu Lys Asp Xaa
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Ile Ile Leu Ser Cys Val Arg
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<213> *saccharomyces cerevisiae*

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<223> Xaa = any amino acid

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Ile Gly Phe Leu Xaa Asp Xaa Arg Arg Ile Asn Val Ala Leu Thr Arg
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Ala Lys

<210> 10

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<212> PRT

<213> saccharomyces cerevisiae

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<223> Xaa = any amino acid

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Leu Glu Xaa Ser Leu Phe Glu Arg Val Leu
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<213> saccharomyces cerevisiae

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<223> Xaa = any amino acid

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Ile Gly Val Ile Thr Pro Tyr Xaa Ala Gln
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<213> saccharomyces cerevisiae

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Leu Ile Gln Gly Pro Pro Gly Thr Gly Lys Thr
1 5 10

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Arg Ile Leu Val Cys Ala Pro Ser Asn Ile Ala Val Asp

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Ile Lys Ile Leu Arg

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<213> *saccharomyces cerevisiae*

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Lys Lys Arg Glu

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<212> PRT

<213> *saccharomyces cerevisiae*

<400> 16

Phe Asp Thr Val Ile Ile Asp Glu Ala Thr Gln

1

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<212> PRT

<213> *saccharomyces cerevisiae*

<400> 17

Leu Ile Pro Leu

1

<210> 18

<211> 5

<212> PRT

<213> saccharomyces cerevisiae

<400> 18

Ile Leu Val Gly Asp

1 5

<210> 19

<211> 7

<212> PRT

<213> saccharomyces cerevisiae

<400> 19

Ser Leu Phe Glu Arg Val Leu

1 5

<210> 20

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<212> PRT

<213> saccharomyces cerevisiae

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Gly Val Ile Thr Pro Tyr

1 5

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<400> 21

Thr Val Asp Ala Phe Gln Gly Arg Glu Lys Asp

1 5 10

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Ile Ile Leu Ser Cys Val Arg

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Ile Gly Phe Leu Lys Asp
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Arg Arg Leu Asn Val Ala Leu Thr Arg Ala Lys
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<400> 25
Leu Gln Gly Pro Pro Gly Thr Gly Lys Thr Ser Thr Ile Glu Glu Ile
1 5 10 15

Ile Ile Gln Val Ile Glu Arg Phe His Ala Phe Pro Ile Leu Cys Val
20 25 30

Ala Ala Ser Asn Ile Ala Ile Asp Asn Ile Ala Glu Lys Ile Met Glu
35 40 45

Asn Arg Pro Gln Ile Lys Ile Leu Arg Ile Leu Ser Lys Lys Lys Glu
50 55 60

Gln Gln Tyr Ser Asp Asp His Pro Leu Gly Glu Ile Cys Leu His Asn
65 70 75 80

Ile Val Tyr Lys Asn Leu Ser Pro Asp Met Gln Val Val Ala Asn Lys
85 90 95

Thr Arg Arg Gly Glu Met Ile Ser Lys Ser Glu Asp Thr Lys Phe Tyr
100 105 110

Lys Glu Lys Asn Arg Val Thr Asn Lys Val Val Ser Gln Ser Gln Ile
115 120 125

Ile	Phe	Thr	Thr	Asn	Ile	Ala	Ala	Gly	Gly	Arg	Glu	Leu	Lys	Val	Ile	130	135	140	
Lys	Glu	Cys	Pro	Val	Val	Ile	Met	Asp	Glu	Ala	Thr	Gln	Ser	Ser	Glu	145	150	155	160
Ala	Ser	Thr	Leu	Val	Pro	Leu	Ser	Leu	Pro	Gly	Ile	Arg	Asn	Phe	Val	165	170	175	
Phe	Val	Gly	Asp	Glu	Lys	Gln	Leu	Ser	Ser	Phe	Ser	Asn	Ile	Pro	Gln	180	185	190	
Leu	Glu	Thr	Ser	Leu	Phe	Glu	Arg	Val	Leu	Ser	Asn	Gly	Thr	Tyr	Lys	195	200	205	
Asn	Pro	Leu	Met	Leu	Asp	Thr	Gln	Tyr	Arg	Met	His	Pro	Lys	Ile	Ser	210	215	220	
Glu	Phe	Pro	Ile	Lys	Lys	Ile	Tyr	Asn	Gly	Glu	Leu	Lys	Asp	Gly	Val	225	230	235	240
Thr	Asp	Glu	Gln	Lys	Ala	Trp	Pro	Gly	Val	Gln	His	Pro	Leu	Phe	Phe	245	250	255	
Tyr	Gln	Cys	Asp	Leu	Gly	Pro	Glu	Ser	Arg	Val	Arg	Ser	Thr	Gln	Arg	260	265	270	
Asp	Ile	Val	Gly	Phe	Thr	Tyr	Glu	Asn	Lys	His	Glu	Cys	Val	Glu	Ile	275	280	285	
Val	Lys	Ile	Ile	Gln	Ile	Leu	Met	Leu	Asp	Lys	Lys	Val	Pro	Leu	Glu	290	295	300	
Glu	Ile	Gly	Val	Ile	Thr	Pro	Tyr	Ser	Ala	Gln	Arg	Asp	Leu	Leu	Ser	305	310	315	320
Asp	Ile	Leu	Thr	Lys	Asn	Val	Val	Ile	Asn	Pro	Lys	Gln	Ile	Ser	Met	325	330	335	
Gln	Gln	Glu	Tyr	Asp	Glu	Ile	Glu	Leu	Phe	Asn	Ala	Ala	Gly	Ser	Gln	340	345	350	
Gly	Thr	Ala	Gly	Ser	Leu	Gln	Asn	Asn	Val	Ile	Asn	Ile	Ile	Asn	Gly	355	360	365	
Leu	His	Val	Ala	Thr	Val	Asp	Ser	Phe	Gln	Gly	His	Glu	Lys	Ser	Phe	370	375	380	

Ile Ile Phe Ser Cys Val Arg Asn Asn Thr Glu Asn Lys Ile Gly Phe
 385 390 395 400

Leu Arg Asp Lys Arg Arg Leu Asn Val Ala Leu Thr Arg Ala Lys
 405 410 415

<210> 26

<211> 472

<212> PRT

<213> *saccharomyces cerevisiae*

<400> 26

Phe Leu Ser Leu Ile Gln Gly Pro Pro Gly Thr Gly Lys Thr Lys Thr
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Ile Leu Gly Ile Ile Gly Tyr Phe Leu Ser Thr Lys Asn Ala Ser Ser
 20 25 30

Ser Asn Val Ile Lys Val Pro Leu Glu Lys Asn Ser Ser Asn Thr Glu
 35 40 45

Gln Leu Leu Lys Lys Gln Lys Ile Leu Ile Cys Ala Pro Ser Asn Ala
 50 55 60

Ala Val Asp Glu Ile Cys Leu Arg Leu Lys Ser Gly Val Tyr Asp Lys
 65 70 75 80

Gln Gly His Gln Phe Lys Pro Gln Leu Val Arg Val Gly Arg Ser Asp
 85 90 95

Val Val Asn Val Ala Ile Lys Asp Leu Thr Leu Glu Glu Leu Val Asp
 100 105 110

Lys Arg Ile Gly Glu Arg Asn Tyr Glu Ile Arg Thr Asp Pro Glu Leu
 115 120 125

Glu Arg Lys Phe Asn Asn Ala Val Thr Lys Arg Arg Glu Leu Arg Gly
 130 135 140

Lys Leu Asp Ser Glu Ser Gly Asn Pro Glu Ser Pro Met Ser Thr Glu
 145 150 155 160

Asp Ile Ser Lys Leu Gln Leu Lys Ile Arg Glu Leu Ser Lys Ile Ile
 165 170 175

Asn Glu Leu Gly Arg Asp Arg Asp Glu Met Arg Glu Lys Asn Ser Val

180	185	190
Asn Tyr Arg Asn Arg Asp Leu Asp Arg Arg Asn Ala Gln Ala His Ile		
195	200	205
Leu Ala Val Ser Asp Ile Ile Cys Ser Thr Leu Ser Gly Ser Ala His		
210	215	220
Asp Val Leu Ala Thr Met Gly Ile Lys Phe Asp Thr Val Ile Ile Asp		
225	230	235 240
Glu Ala Cys Gln Cys Thr Glu Leu Ser Ser Ile Ile Pro Leu Arg Tyr		
	245	250 255
Gly Gly Lys Arg Cys Ile Met Val Gly Asp Pro Asn Gln Leu Pro Pro		
	260	265 270
Thr Val Leu Ser Gly Ala Ala Ser Asn Phe Lys Tyr Asn Gln Ser Leu		
	275	280 285
Phe Val Arg Met Glu Lys Asn Ser Ser Pro Tyr Leu Leu Asp Val Gln		
	290	295 300
Tyr Arg Met His Pro Ser Ile Ser Lys Phe Pro Ser Ser Glu Phe Tyr		
305	310	315 320
Gln Gly Arg Leu Lys Asp Gly Pro Gly Met Asp Ile Leu Asn Lys Arg		
	325	330 335
Pro Trp His Gln Leu Glu Pro Leu Ala Pro Tyr Lys Phe Phe Asp Ile		
	340	345 350
Ile Ser Gly Arg Gln Glu Gln Asn Ala Lys Thr Met Ser Tyr Thr Asn		
	355	360 365
Met Glu Glu Ile Arg Val Ala Ile Glu Leu Val Asp Tyr Leu Phe Arg		
	370	375 380
Lys Phe Asp Asn Lys Ile Asp Phe Thr Gly Lys Ile Gly Ile Ile Ser		
385	390	395 400
Pro Tyr Arg Glu Gln Met Gln Lys Met Arg Lys Glu Phe Ala Arg Tyr		
	405	410 415
Phe Gly Gly Met Ile Asn Lys Ser Ile Asp Phe Asn Thr Ile Asp Gly		
	420	425 430
Phe Gln Gly Gln Glu Lys Glu Ile Ile Leu Ile Ser Cys Val Arg Ala		

435	440	445
Asp Asp Thr Lys Ser Ser Val Gly Phe Leu Lys Asp Phe Arg Arg Met		
450	455	460
Asn Val Ala Leu Thr Arg Ala Lys		
465	470	
<210> 27		
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<212> PRT		
<213> <i>saccharomyces cerevisiae</i>		
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Tyr Ala Leu Ile Leu Gly Met Pro Gly Thr Gly Lys Thr Thr Val Ile		
1	5	10 15
Ala Glu Ile Ile Lys Ile Leu Val Ser Glu Gly Lys Arg Val Leu Leu		
20	25	30
Thr Ser Tyr Thr His Ser Ala Val Asp Asn Ile Leu Ile Lys Leu Arg		
35	40	45
Asn Thr Asn Ile Ser Ile Met Arg Leu Gly Met Lys His Lys Val His		
50	55	60
Pro Asp Thr Gln Lys Tyr Val Pro Asn Tyr Ala Ser Val Lys Ser Tyr		
65	70	75 80
Asn Asp Tyr Leu Ser Lys Ile Asn Ser Thr Ser Val Val Ala Thr Thr		
85	90	95
Cys Leu Gly Ile Asn Asp Ile Leu Phe Thr Leu Asn Glu Lys Asp Phe		
100	105	110
Asp Tyr Val Ile Leu Asp Glu Ala Ser Gln Ile Ser Met Pro Val Ala		
115	120	125
Leu Gly Pro Leu Arg Tyr Gly Asn Arg Phe Ile Met Val Gly Asp His		
130	135	140
Tyr Gln Leu Pro Pro Leu Val Lys Asn Asp Ala Ala Arg Leu Gly Gly		
145	150	155 160
Leu Glu Glu Ser Leu Phe Lys Thr Phe Cys Glu Lys His Pro Glu Ser		
165	170	175

Val Ala Glu Leu Thr Leu Gln Tyr Arg Met Cys Gly Asp Ile Val Thr
180 185 190

Leu Ser Asn Phe Leu Ile Tyr Asp Asn Lys Leu Lys Cys Gly Asn Asn
195 200 205

Glu Val Phe Ala Gln Ser Leu Glu Leu Pro Met Pro Glu Ala Leu Ser
210 215 220

Arg Tyr Arg Asn Glu Ser Ala Asn Ser Lys Gln Trp Leu Glu Asp Ile
225 230 235 240

Leu Glu Pro Thr Arg Lys Val Val Phe Leu Asn Tyr Asp Asn Cys Pro
245 250 255

Asp Ile Ile Glu Gln Ser Glu Lys Asp Asn Ile Thr Asn His Gly Glu
260 265 270

Ala Glu Leu Thr Leu Gln Cys Val Glu Gly Met Leu Leu Ser Gly Val
275 280 285

Pro Cys Glu Asp Ile Gly Val Met Thr Leu Tyr Arg Ala Gln Leu Arg
290 295 300

Leu Leu Lys Lys Ile Phe Asn Lys Asn Val Tyr Asp Gly Leu Glu Ile
305 310 315 320

Leu Thr Ala Asp Gln Phe Gln Gly Arg Asp Lys Lys Cys Ile Ile Ile
325 330 335

Ser Met Val Arg Arg Asn Ser Gln Leu Asn Gly Gly Ala Leu Leu Lys
340 345 350

Glu Leu Arg Arg Val Asn Val Ala Met Thr Arg Ala Lys Ser
355 360 365

<210> 28

<211> 414

<212> PRT

<213> *saccharomyces cerevisiae*

<400> 28

His Gly Pro Pro Gly Thr Gly Lys Thr Phe Thr Leu Ile Glu Leu Ile
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Gln Gln Leu Leu Ile Lys Asn Pro Glu Glu Arg Ile Leu Ile Cys Gly
20 25 30

Pro	Ser	Asn	Ile	Ser	Val	Asp	Thr	Ile	Leu	Glu	Arg	Leu	Thr	Pro	Leu			
		35					40					45						
Val	Pro	Asn	Asn	Leu	Leu	Leu	Arg	Ile	Gly	His	Pro	Ala	Arg	Leu	Leu			
	50					55					60							
Asp	Ser	Asn	Lys	Arg	His	Ser	Leu	Asp	Ile	Leu	Ser	Lys	Lys	Asn	Thr			
65					70					75					80			
Ile	Val	Lys	Asp	Ile	Ser	Gln	Glu	Ile	Asp	Lys	Leu	Ile	Gln	Glu	Asn			
				85					90					95				
Lys	Lys	Leu	Lys	Asn	Tyr	Lys	Gln	Arg	Lys	Glu	Asn	Trp	Asn	Glu	Ile			
		100					105						110					
Lys	Leu	Leu	Arg	Lys	Asp	Leu	Lys	Lys	Arg	Glu	Phe	Lys	Thr	Ile	Lys			
	115					120						125						
Asp	Leu	Ile	Ile	Gln	Ser	Arg	Ile	Val	Val	Thr	Thr	Leu	His	Gly	Ser			
130						135					140							
Ser	Ser	Arg	Glu	Leu	Cys	Ser	Leu	Tyr	Arg	Asp	Asp	Pro	Asn	Phe	Gln			
145					150					155					160			
Leu	Phe	Asp	Thr	Leu	Ile	Ile	Asp	Glu	Val	Ser	Gln	Ala	Met	Glu	Pro			
			165					170						175				
Gln	Cys	Trp	Ile	Pro	Leu	Ile	Ala	His	Gln	Asn	Gln	Phe	His	Lys	Leu			
		180					185						190					
Val	Leu	Ala	Gly	Asp	Asn	Lys	Gln	Leu	Pro	Pro	Thr	Ile	Lys	Thr	Glu			
	195					200						205						
Asp	Asp	Lys	Asn	Val	Ile	His	Asn	Leu	Glu	Thr	Thr	Leu	Phe	Asp	Arg			
210					215						220							
Ile	Ile	Lys	Ile	Phe	Pro	Lys	Arg	Asp	Met	Val	Lys	Phe	Leu	Asn	Val			
225					230				235					240				
Gln	Tyr	Arg	Met	Asn	Gln	Lys	Ile	Met	Glu	Phe	Pro	Ser	His	Ser	Met			
			245					250						255				
Tyr	Asn	Gly	Lys	Leu	Leu	Ala	Asp	Ala	Thr	Val	Ala	Asn	Arg	Leu	Leu			
		260				265						270						
Ile	Asp	Leu	Pro	Thr	Val	Asp	Ala	Thr	Pro	Ser	Glu	Asp	Asp	Asp	Asp			
	275					280						285						

Thr Lys Ile Pro Leu Ile Trp Tyr Asp Thr Gln Gly Asp Glu Phe Gln
 290 295 300

Glu Thr Ala Asp Glu Ala Thr Ile Leu Gly Ser Lys Tyr Asn Glu Gly
 305 310 315 320

Glu Ile Ala Ile Val Lys Glu His Ile Glu Asn Leu Arg Ser Phe Asn
 325 330 335

Val Pro Glu Asn Ser Ile Gly Val Ile Ser Pro Tyr Asn Ala Gln Val
 340 345 350

Ser His Leu Lys Lys Leu Ile His Asp Glu Leu Lys Leu Thr Asp Ile
 355 360 365

Glu Ile Ser Thr Val Asp Gly Phe Gln Gly Arg Glu Lys Asp Val Ile
 370 375 380

Ile Leu Ser Leu Val Arg Ser Asn Glu Lys Phe Glu Val Gly Phe Leu
 385 390 395 400

Lys Glu Glu Arg Arg Leu Asn Val Ala Met Thr Arg Pro Arg
 405 410

<210> 29

<211> 380

<212> PRT

<213> *saccharomyces cerevisiae*

<400> 29

Pro Leu Ser Leu Ile Gln Gly Pro Pro Gly Thr Gly Lys Thr Val Thr
 1 5 10 15

Ser Ala Thr Ile Val Tyr His Leu Ser Lys Ile His Lys Asp Arg Ile
 20 25 30

Leu Val Cys Ala Pro Ser Asn Val Ala Val Asp His Leu Ala Ala Lys
 35 40 45

Leu Arg Asp Leu Gly Leu Lys Val Val Arg Leu Thr Ala Lys Ser Arg
 50 55 60

Glu Asp Val Glu Ser Ser Val Ser Asn Leu Ala Leu His Asn Leu Val
 65 70 75 80

Gly Arg Gly Ala Lys Gly Glu Leu Lys Asn Leu Leu Lys Leu Lys Asp

				85					90					95			
Glu	Val	Gly	Glu	Leu	Ser	Ala	Asp	Ser	Thr	Lys	Arg	Phe	Val	Lys	Leu		
			100					105					110				
Val	Arg	Lys	Thr	Glu	Ala	Glu	Ile	Leu	Asn	Lys	Ala	Asp	Val	Val	Cys		
		115					120					125					
Cys	Thr	Cys	Val	Gly	Ala	Gly	Asp	Lys	Arg	Leu	Asp	Thr	Lys	Phe	Arg		
	130					135					140						
Thr	Val	Leu	Ile	Asp	Glu	Ser	Thr	Gln	Ala	Ser	Glu	Pro	Glu	Cys	Leu		
145					150					155					160		
Ile	Pro	Ile	Val	Lys	Gly	Ala	Lys	Gln	Val	Ile	Leu	Val	Gly	Asp	His		
				165					170					175			
Gln	Gln	Leu	Gly	Pro	Val	Ile	Leu	Glu	Arg	Lys	Ala	Ala	Asp	Ala	Gly		
			180					185					190				
Leu	Lys	Gln	Ser	Leu	Phe	Glu	Arg	Leu	Ile	Ser	Leu	Gly	His	Val	Pro		
	195						200					205					
Ile	Arg	Leu	Glu	Val	Gln	Tyr	Arg	Met	Asn	Pro	Tyr	Leu	Ser	Glu	Phe		
	210					215					220						
Pro	Ser	Asn	Met	Phe	Tyr	Glu	Gly	Ser	Leu	Gln	Asn	Gly	Val	Thr	Ile		
225					230					235					240		
Glu	Gln	Arg	Thr	Val	Pro	Asn	Ser	Lys	Phe	Pro	Trp	Pro	Ile	Arg	Gly		
				245					250					255			
Ile	Pro	Met	Met	Phe	Trp	Ala	Asn	Tyr	Gly	Arg	Glu	Glu	Ile	Ser	Ala		
			260					265					270				
Asn	Gly	Thr	Ser	Phe	Leu	Asn	Arg	Ile	Glu	Ala	Met	Asn	Cys	Glu	Arg		
		275					280					285					
Ile	Ile	Thr	Lys	Leu	Phe	Arg	Asp	Gly	Val	Lys	Pro	Glu	Gln	Ile	Gly		
	290					295					300						
Val	Ile	Thr	Pro	Tyr	Glu	Gly	Gln	Arg	Ala	Tyr	Ile	Leu	Gln	Tyr	Met		
305					310					315					320		
Gln	Met	Asn	Gly	Ser	Leu	Asp	Lys	Asp	Leu	Tyr	Lys	Ile	Val	Glu	Val		
				325					330					335			
Ala	Ser	Val	Asp	Ala	Phe	Gln	Gly	Arg	Glu	Lys	Asp	Tyr	Ile	Ile	Leu		

340

345

350

Ser Cys Val Arg Ala Asn Glu Gln Gln Ala Ile Gly Phe Leu Arg Asp
355 360 365

Pro Arg Arg Leu Asn Val Gly Leu Thr Arg Ala Lys
370 375 380

<210> 30

<211> 7

<212> PRT

<213> *Saccharomyces cerevisiae*

<400> 30

Leu Asp Val Gln Tyr Arg Met
1 5

<210> 31

<211> 6

<212> PRT

<213> *Saccharomyces cerevisiae*

<400> 31

Ile Ser Glu Phe Pro Ser
1 5

<210> 32

<211> 6

<212> PRT

<213> *Saccharomyces cerevisiae*

<400> 32

Ile Tyr Asn Gly Arg Leu
1 5